

Chiropractic Health Care in Health Professional Shortage Areas in the United States

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Complementary and alternative medicine (CAM) use in the United States has grown markedly.^{1–3} Evidence suggests that lifetime CAM use increases with age across age cohorts and that half of all CAM patients continue to use CAM for many years.⁴ Such documented trends have raised awareness and interest in the CAM disciplines,^{5–7} thus driving further research and discussion about CAM patients' use and utilization of medical or preventive services,^{1,8,9} the inclusion of CAM in private insurance and managed care,^{10–12} and the actual or potential roles of CAM practitioners as additional nonphysician primary care providers in the US health workforce.^{13–20}

Chiropractic health care is among the largest and most high-profile of the established nonallopathic singular health care disciplines, and chiropractic users consistently represent the largest share in surveys of CAM users overall.^{2,9} A substantial body of rigorous scientific evidence supports the efficacy and effectiveness of spinal manipulation for various conditions.^{21–27} Additionally, the chiropractic profession has established structures and processes for further developing and disseminating that evidence base and for fostering effective, evidence-based education, training, and practice.^{28–33}

Chiropractic education and clinical training in the 17 accredited chiropractic colleges in the United States combines discipline-specific chiropractic assessment and therapeutic procedures with standard medical diagnosis and procedures, excluding invasive or critical care procedures, pharmacology, and surgery.^{29,30} Hours of education and training required in chiropractic and medical school curricula are 4820 in the doctor of chiropractic (DC) program, compared with 4670 in the doctor of medicine (MD) program (not counting postgraduate clinical residency hours of MDs). Curricular differences include a greater emphasis on biomechanics, musculoskeletal function, and manual procedures for chiropractic students and a substantially longer mentored clinical experience

Objectives. We compared chiropractic practice volume in areas of high versus areas of low or no shortages of primary care providers.

Methods. Using data from a cross-sectional survey of US chiropractors and data from the Bureau of Health Professions' Area Resource File, we conducted multiple linear and logistic regression modeling of the effects of rural or Health Professional Shortage Area location on chiropractic practice volume and wait times.

Results. Chiropractors in rural and high-shortage areas have busier, higher-volume practices than do those in other locales (after control for other chiropractors in the same market service area).

Conclusions. Chiropractic providers render a substantial amount of care to underserved and rural populations. Health policy planners should consider the full complement of providers available to improve access to care. (*Am J Public Health.* 2002;92:2001–2009)

for medical students in both undergraduate and postgraduate training.^{34,35}

Ongoing interest and efforts relative to practice, research, and policy have been directed toward studying the characteristics of chiropractic patients and practice, the relationship between chiropractic and other health care providers, and the distribution, use, and utilization of chiropractic services. Patient characteristics associated with chiropractic use may include poorer health status,³⁶ older age, reportage of a greater number of chronic health problems, more frequent physician visits, and greater difficulty in obtaining an appointment with a physician.³⁷ Chiropractic patients in rural areas may be more likely than those in more urban locales to present with nonmusculoskeletal complaints.^{38,39} A high level of satisfaction with chiropractic care and a strong chiropractor–patient relationship^{40–44} may especially characterize chiropractic practices in rural, medically underserved areas.⁴⁵

Chiropractic patients may typically use a DC as a first point of contact with the health care system,⁴⁶ particularly in rural areas.⁴⁷ Most chiropractic patients self-report that they do not use other providers' services while under chiropractic care⁴⁶; however, more than 97% of DCs report that they refer their patients for medical care as needed.^{48–51} Slightly more than half of surveyed family physicians report referring patients to DCs.^{43,49} Bidirectional referral

relationships between MDs and DCs may be more active in rural areas,³⁸ among younger or newer practitioners,^{48,52} and among MDs who feel informed about chiropractic care.⁵² The majority of surveyed chiropractors convey a self-perception of practicing in a primary care capacity⁵³; they also report that they provide primary care services such as health history assessments and physical examinations of their patients on a routine basis.^{51,53} An interdisciplinary expert focus group (DCs, MDs, physician assistants, and nurse practitioners) concurred that DCs are able to make diagnoses in more than 90%—and therapeutic contributions in more than half—of primary care activities, although more DCs than other participants perceived a need for physician involvement in primary care activities.⁵⁴ The position of the chiropractic profession is that prevention and health promotion are integral to chiropractic care,²⁸ and most DCs agree.^{53,55–57} However, the actual provision of such services varies somewhat among chiropractic providers^{53,55} and may be related to where their practices are located.⁴⁵

High DC-to-population ratios are associated with smaller towns.⁵⁸ Half of surveyed DCs practice in communities with populations under 50 000,^{53,55} and most rural-practicing DCs also originally come from rural areas.³⁸ Findings on the relationship between locale and chiropractic utilization have been mixed. Hawk⁵⁹ and

Cote et al.⁶⁰ reported higher rural and higher urban use of chiropractic care, respectively, and Shekelle and Brook⁶¹ reported both. Whereas an early ecological-level analysis of 4 regions ranked chiropractic utilization rates in the same order as chiropractors per population,⁶² a more recent study comparing regions that varied by geography and DC-to-population ratios found no relation between DC density and visit rates, although patterns of treatment (amount of care provided per episode) did vary significantly across geographic sites.⁶¹ In a cohort study of chiropractic utilization in a medically underserved rural Iowa area, no relation was found between level of access to physician services (measured as growth in the physician workforce) and the use of chiropractic services.³⁶

Given such a mix of intriguing and sometimes conflicting findings, further work is warranted to clarify our understanding of actual and potential roles of chiropractors in meeting the health care needs of underserved or rural populations. Such studies should include comprehensive and policy-relevant definitions of “underserved,” such as the Health Professional Shortage Area (HPSA) designation. Studies should also include and control for a number of other potential predictors of chiropractic service use (e.g., rurality or DC and population densities) to sort out their differential effects.

It is also important to embed study of chiropractic use within relevant conceptual frameworks and to apply the appropriate methodologies of health services research. For instance, as a dimension of access to health care, wait times (both before and during scheduled and walk-in visits) may be used to measure time barriers or organizational barriers to patients.⁶³ For both conceptual and methodological reasons, consideration of provider-specific market service areas as a useful unit or level of analysis is fundamental, whether as a means of studying issues relative to workforce capacity or access or as the context for studies of provider competition or collaboration.^{64–70}

In an earlier study,⁷¹ we surveyed Missouri chiropractors, comparing chiropractic practices serving high- or whole-shortage HPSAs with those serving low-, part- or nonshortage areas. Chiropractic practices serving high-shortage areas had significantly higher practice volumes (numbers of weekly visits and of annual new patients), even after control for DC density and

rural location. Although rural location was a significant predictor of annual new patients, it was not significantly related to number of weekly visits.

As a follow-up to an earlier preliminary single-state survey, our study surveyed a national sample of active, licensed DCs. Specifically, that survey tested (1) the hypothesized relationship between chiropractic practice volume and location in HPSAs or rural areas, and controlled for various characteristics of DCs or their practice environments that might also affect practice volumes, and (2) whether there were differences in wait times between chiropractic practices in high-shortage versus low- or no-shortage HPSAs, or in rural versus nonrural locations.

METHODS

In this descriptive cross-sectional study, we used a 1997 mail survey of a random sample of US chiropractors stratified by zip code region. The sample was drawn from a list of approximately 30 000 DCs compiled from US telephone directory pages (white and yellow) and modified to remove duplicate names and practices. This sampling frame is comparable to the 32 000 estimated actively practicing DCs in the United States (of 46 196 total licensed chiropractors) reported in the National Board of Chiropractic Examiners' 1993 survey.⁵⁰ A computer-generated random sample of 2000 DCs was stratified by the 10 zip code regions in the United States; 104 surveys were returned as undeliverable (effective sampled $n = 1896$).

To maximize the response rate, the survey was administered using hand-addressed envelopes; a personalized, hand-signed cover letter emphasizing the importance of the survey and assuring respondents of anonymity; a postage-paid return envelope; and a user-friendly questionnaire that had been pilot-tested for ease of response and clarity. Follow-up postcard reminders were mailed out 2 weeks after the initial mailing. Response to an initial 3-page survey was 30% (563/1896). A follow-up survey to nonrespondents, shortened to 1 page to decrease respondent burden, yielded an additional 247 responses, for a final survey response rate of 43%. Fifty randomly selected nonrespondents were contacted by telephone. Most nonrespondents stated that

they didn't feel that the survey was important or that they didn't have the time to complete the survey.

The survey collected baseline demographic data on sex, practice status (full- vs part-time), chiropractic college, and year of graduation. DCs were asked to list up to 5 counties making up their individual market service areas (defined as the entire area from which they drew patients) and were queried on the following items to characterize their individual practices: weekly hours in practice, number of weekly patient office visits, whether nonscheduled patients (i.e., “walk-ins”) were accepted for a same-day initial visit, average wait time for scheduled and nonscheduled patients (in minutes), number of new patients accepted in prior calendar year, and whether new patients were scheduled for an initial visit within 1 day.

Data from each survey were key-entered using double-entry verification and automatic validation schemes and then imported into a Microsoft Access database. The survey data were linked to the Area Resource File (ARF) system of the Health Resources and Services Administration's Bureau of Health Professions for measures of practice environment (for example, whether any county in the DC's market service area was designated as a whole-shortage HPSA) average rural/urban continuum code (US Department of Agriculture) across all of the DC's market counties, and population density. The database was later supplemented with aggregate information on number of DCs per county, obtained from the most extensive list then available (the proprietary mailing list of the newspaper *Dynamic Chiropractic*, which had been reconciled to a list from the Federation of Chiropractic Licensing Boards).

Analyses of association were conducted using multivariable regression modeling. All models included the same 2 sets of independent variables measuring attributes of individual DCs and of their practice markets. Chiropractor attribute measures were full-time vs part-time practice, male vs female, and years active (computed from date of graduation). Practice market measures included presence of whole-shortage HPSA in market (yes, no), average rurality across market (continuum of 0–9), average population per DC ratio across market, and presence in the practice market of a chiropractic college (yes, no). Four of the 5 continu-

ous dependent variables exhibited substantial skewness and kurtosis (principally due to a very small number of outliers to the right), and we therefore truncated these variables at the 99th percentile to effectively normalize their distributions before we ran separate linear regressions on each. The dependent variables included weekly practice hours, weekly patient visits (truncated with all values >350 visits subsumed into 1 final value of ≥ 350), annual new patients (truncated at ≥ 800 patients), wait time for walk-in patients (truncated at ≥ 75 minutes), and wait time for scheduled patients (truncated at ≥ 45 minutes). The 2 dichotomous dependent variables—whether walk-in patients were accepted (yes, no) and the wait of

new patients for an initial visit (same/next day vs ≥ 2 days)—were modeled through logistic regression. All statistical calculations were performed with SPSS for Windows, Release 7.0 (SPSS Inc, Chicago, Ill).

RESULTS

The survey response rate was 43% (815/1896). The demographics of our respondents were similar to those reported in surveys of US chiropractors from the National Board of Chiropractic Examiners (Table 1).^{50,51}

Eighty-eight percent (715/815) of the respondent chiropractors reported providing care to patients from HPSA counties designated as

having a whole or partial shortage of health professionals. Of those, 101 DCs served patients from whole-shortage counties. Most DCs (77%) reported drawing their patient base from multiple counties, with 60% reporting patients from a market service area encompassing 3 or more counties. For added perspective, Figures 1 and 2 present national distributions of chiropractors, chiropractic colleges, and HPSAs.^{72–75}

Multivariate linear and logistic regression results (Table 2) indicated that HPSA location was positively related to chiropractic practice volume (measured in visits or patients), even after control for rurality or the density of other chiropractic providers in the practice market. The combined effects of HPSA and rural location are significant and substantial. With each incremental increase of the DC's rural location index adding another 9 new patients annually to the DC's patient base, DCs located in extremely rural areas (index=9) may see an average of 81 more new patients annually (9×9) compared with DCs in large metropolitan areas (index=0). After we factored in the added effect of practice in a high-shortage HPSA location, DCs in high-shortage rural HPSAs may see 127 more new patients annually ($81 + 46$) than their colleagues in nonshortage urban locales. Post hoc testing for multicollinearity between the independent variables yielded negative results (maximum variance inflation factor=1.6).

Wait times do not appear to vary by HPSA location, although practices located in less-populated areas are less inclined to accept walk-in patients, have longer wait times for walk-ins when accepted, and also have generally longer waits for new patients seeking an initial visit. Interestingly, the population-adjusted density of other chiropractors located in a DC's practice market does not significantly affect either practice volume or wait times.

A previous survey of Missouri-licensed DCs⁷¹ suggested that rural location was associated with a greater number of new patients annually but not with a concomitant increase in weekly visits, a finding similarly revealed in this study. Such a finding might be explained by a greater likelihood of newly graduated DCs with growing practices to be located in rural areas (i.e., newer practices would have relatively more new patients). However, a bivariate analysis of year of graduation by rural-

TABLE 1—Characteristics of Survey Respondents, by Survey

	US DCs, ^a 1991	US DCs, ^b 1998	Smith and Carber 1997 ^c
Full-time vs part-time, %	82	88	93
Male, %	87	81	86
Years active, % ^d			16.1, 9.0 ^e
5–15	57	47	
≥ 16	25	35	
Practice hours/week, %			35.3, 9.2 ^e
≤ 29	11	17	
30–39	46	46	
40–49	33	29	
≥ 50	10	8	
Chiropractic college attended, %			
Palmer (Davenport, Iowa)	28	22	22
National (Chicago, Ill)	12	9	10
Life (Marietta, Ga)	9	12	10
Logan (St. Louis, Mo)	8	8	8
New York CC	7	7	10
Los Angeles CC	7	8	6
Remaining US colleges (each $\leq 5\%$)	27	32	30
Other non-US college, or US college now closed	2	2	4
No. of patient visits/week			112.2, 69.3 ^e
No. of annual new patients			187.1, 151.8 ^e
New patient wait for initial visit, % scheduled within 1 day			90
Scheduled patient wait time, minutes			8.2, 6.4 ^e
Accept walk-in patients, % yes			91
Walk-in patient wait time, minutes			20.6, 13.1 ^e

Note. DC = Doctor of Chiropractic; CC = chiropractic college. National Board of Chiropractic Examiners (NBCE) data (both years) reflect only DCs practicing full-time.

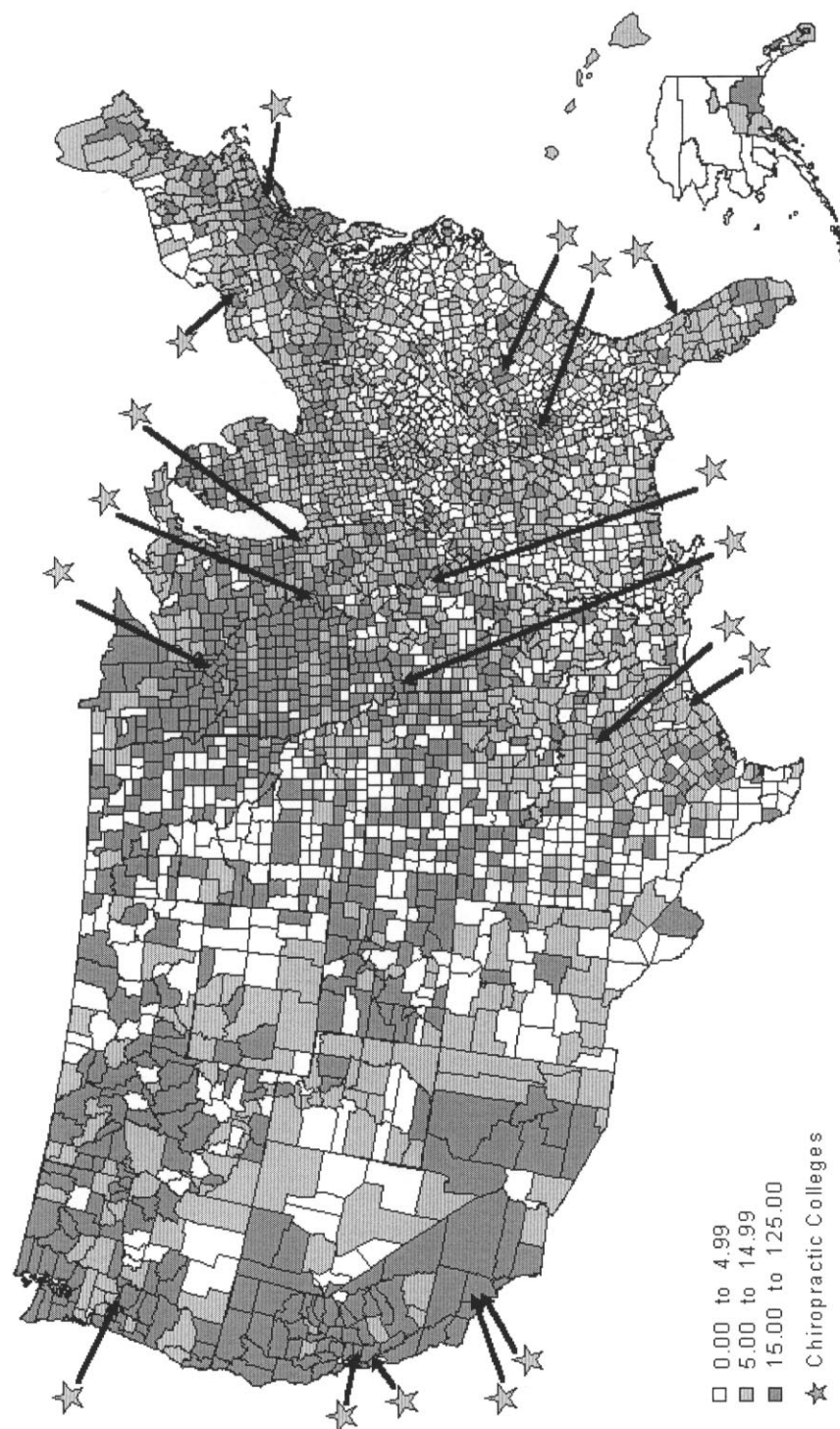
^aData from NBCE.⁵⁰

^bData from NBCE.⁵¹

^cData collected by Smith and Carber in 1997 and published in this article.

^dFor active years, NBCE queried for "Total years in active practice," whereas Smith and Carber queried for "Year of graduation from chiropractic college."

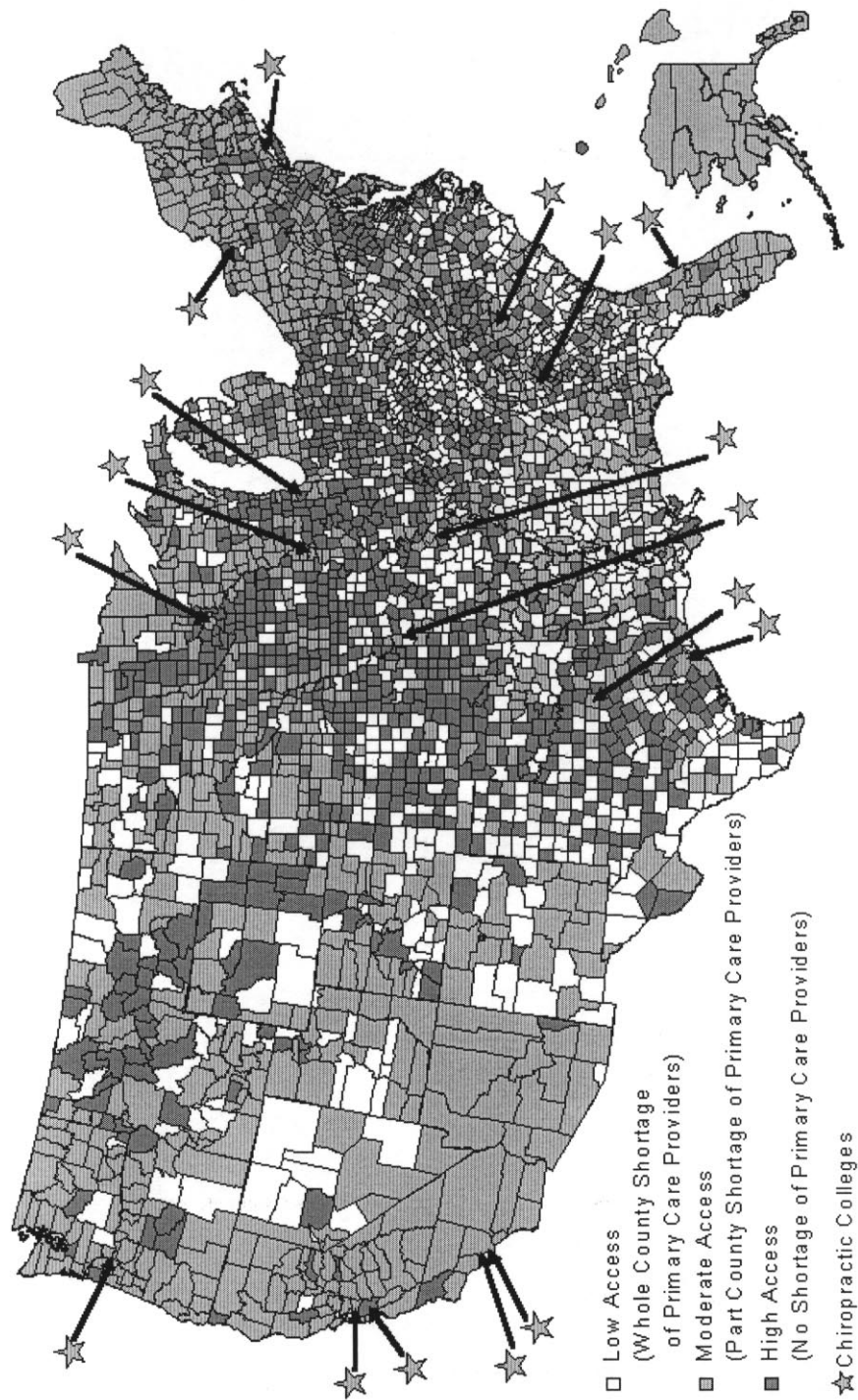
^eMean and standard deviation.



Note. Distribution has not been adjusted for chiropractic college faculty licenses.

Source: Proprietary mailing list, unpublished; Dynamic Chiropractic [newspaper]; Huntington Beach, Calif; 1998. Courtesy of Palmer Center for Chiropractic Research, Palmer College of Chiropractic, 2002.

FIGURE 1—US chiropractors per 100 000 population, by county: 1998.



Source: Area Resource File, Baltimore, MD: Health Resources Services Administration, Bureau of Health Professions; 1996. Courtesy of Palmer Center for Chiropractic Research, Palmer College of Chiropractic, 2002.

FIGURE 2—Access to primary medical care providers in the United States.

TABLE 2—Individual and Market-Level Characteristics Related to Chiropractic Practice Volume and Wait Times: Survey of Doctors of Chiropractic, 1997

	Coefficient (95% CI)				OR (95% CI)		
	Hours per Week ^a (n = 707)	Visits per Week ^a (n = 681)	Annual New Patients ^a (n = 722)	Walk-In Wait, Minutes ^a (n = 662) ^c	Scheduled Patient Wait, Minutes ^a (n = 733)	Accept Walk-Ins: Yes (0), No (1) ^b (n = 730)	New Patient Wait for Initial Visit: Same/Next Day (0); ≥ 2 Days (1) ^b (n = 732)
Individual DC predictors							
Full-time (0), part-time (1)	-16.6 (-18.9, -14.3)***	-61.6 (-81.7, -41.6)***	-90.8 (-133.3, -48.2)***	0.2 (-4.0, 4.3)	-2.0 (-3.9, -0.03)**	0.8 (0.3, 2.2)	1.6 (0.7, 3.5)
Male (0), female (1)	-2.8 (-4.5, -1.0)***	-18.4 (-33.3, -3.5)***	-32.7 (-64.2, -1.3)**	4.4 (1.4, 7.5)***	-0.2 (-1.6, 1.2)	1.9 (0.9, 3.9)*	2.6 (1.4, 5.1)***
Years active	-0.07 (-0.13, 0.001)**	0.3 (-0.3, 0.9)	-0.4 (-1.6, 0.9)	0.2 (0.06, 0.3)***	0.1 (-0.003, 0.11)*	1.1 (1.0, 1.1)***	1.04 (1.01, 1.07)***
Market-level DC predictors							
Location within HPSA: no (0), yes (1)	1.9 (-0.14, 4.0)*	27.3 (9.8, 44.8)***	46.3 (9.3, 83.2)***	-0.3 (-3.9, 3.2)	0.9 (-0.8, 2.6)	0.5 (0.2, 1.2)*	0.6 (0.2, 1.4)
Rurality index: metropolitan (0) to rural (9)	-0.05 (-0.37, 0.27)	-1.6 (-4.3, 1.2)	9.4 (3.7, 15.1)***	0.7 (0.1, 1.2)**	-0.1 (-0.3, 0.2)	1.2 (1.1, 1.4)***	1.1 (1.0, 1.3)*
Population per DC	-0.0003 (-0.001, 0.000)**	-0.00003 (-0.003, 0.003)	-0.002 (-0.007, 0.004)	-0.0002 (-0.001, 0.000)	0.0002 (0.000, 0.000)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0)
Presence in practice market of a chiropractic college: no (0), yes (1)	0.4 (-1.3, 2.0)	-14.9 (-29.1, -0.58)**	-14.6 (-44.0, 14.8)	-2.0 (-4.8, 0.9)	0.2 (-1.2, 1.5)	1.9 (0.9, 3.8)*	1.6 (0.8, 3.2)
Constant	58.4 (55.1, 61.7)***	197 (168.4, 225.6)***	307.8 (248.1, 367.5)***	12.5 (6.7, 18.3)***	9.2 (6.4, 11.9)***	β(SE) = -3.6 (0.4)***	β(SE) = -3.6 (0.4)***

Note. DC = Doctor of Chiropractic; CI = confidence interval; OR = odds ratio; HPSA = Health Professional Shortage Area; SE = standard error.

^aLinear regression model.

^bLogistic regression model.

^cIncludes only DCs who reported accepting walk-ins.

* $P < .10$; ** $P < .05$; *** $P < .01$.

ity on this nationwide sample did not support that hypothesis (Pearson correlation: $P < .182$).

DISCUSSION

Chiropractic providers render a substantial amount of care to underserved populations such as those in designated health workforce shortage areas. Our study findings indicate that chiropractic practices in high-shortage and rural areas have significantly higher volumes of annual new patients. Possible explanations for this finding are that populations in HPSAs or more rural areas have a higher prevalence of “typical chiropractic conditions” (e.g., back pain or musculoskeletal disorders) or that they are more likely to seek care for such conditions, which could at least partly account for a higher practice volume in those areas. Analyses of data from the National Health Interview Survey did not show differences in the prevalence of back problems by population density after control for the effects of potential confounders, although differences by geographic region—consistent with findings from an earlier study^{76,77}—were seen. There does not appear to be a relationship between care-seeking for back pain and geographic region or population density.⁷⁸

The limitations of our study must also be considered. Self-reported individual recollections should always be interpreted cautiously, and the limited study design did not allow us to examine potential bias from possible misclassification. The low response rate to our survey of chiropractors is also potentially problematic. If nonrespondents disproportionately represented extremely busy DCs (as their excuses for nonresponse might suggest), then their nonparticipation may also have selectively biased our sample by overemphasizing less busy practitioners. If busier DCs are also more likely to be located in rural or underserved areas, those levels and types of practice/market characteristics may also have been disproportionately underrepresented in our sample and analysis. Future studies along this line may be more informative by directing a more concerted effort toward following up and gathering pertinent information from nonrespondents when possible.

More work needs to be directed toward better clarifying and modeling the relationships between the characteristics of chiropractic market service areas (including health care system

factors) and of chiropractic practices and chiropractic patients. Given our study findings of significant differences in practice volume and wait times related to practice location, it appears that chiropractic health care providers may already be serving in some function to fill the gap in health care system capacity in medically underserved or rural areas, or perhaps otherwise substituting for other types of health care services in response to specific patient demand in certain markets. Chiropractic patients in rural or underserved areas may have a greater propensity to also use DCs as a first point of contact⁴⁷ or for care of nonmusculoskeletal conditions,^{38,39} and DCs in rural or underserved areas may experience relatively more active bidirectional referral relationships³⁸ or be more likely to provide preventive services.⁴⁵ If so, the nature of the “cultural or social authority”⁷⁹ exercised or experienced by chiropractors in the context of their market-specific health care systems and the cultural/social congruence between DCs and their respective patient or market populations may also differ somewhat by locale.

We speculate that chiropractic practices and practitioners may evolve differently in response to the needs and demands of the patient populations specific to their market service areas. The chiropractic profession may actually encompass a heterogeneous set of practitioners with varied disciplinary foci. DCs with patients who have ready access to primary medical care or who are in markets with a medically dominated orientation to health care organization and delivery may focus their emphasis as musculoskeletal specialists. In areas or markets where populations have curtailed use of medical services, either by necessity due to less access or by choice/preference, chiropractors may respond by adopting a broader, more accommodating generalist orientation to chiropractic practice. Chiropractors’ undergraduate and postgraduate preparation to fill such divergent roles⁸⁰ should be sufficiently comprehensive and appropriate, perhaps necessitating a reexamination of the nature and extent of the current clinical education of DCs. Also, the historical isolation of chiropractic clinical training from medical training and the dearth of opportunities for chiropractic training and practice in varied multidisciplinary clinical settings should be addressed. Our understanding of the actual

and potential roles of chiropractic health care in the US health care delivery system is limited at best and warrants additional attention.

The shortage of MDs in rural and underserved areas remains a long-standing and serious problem.^{81–83} The deployment of non-MD practitioners in varied arrangements and settings offers promise as a viable and sustainable solution to improving primary care access.^{84–88} As a key nonmedical discipline that has achieved pronounced levels of professionalization^{28–33} and health system integration and inclusion,^{6,11,15,89–93} chiropractic health care may serve as a useful example of how health services research and policies on access to care, primary care workforce capacity, and the unmet needs of identified underserved populations^{13,81–88,94–104} may intersect with research into and policies of evidence-based CAM health care delivery. The extent to which DCs might contribute to addressing this nation’s health workforce needs, particularly those of underserved populations, warrants further investigation. Specifically, more study is needed to document and examine the distribution of chiropractic providers relative to underserved areas, the scope and scale of services provided to chiropractic patients, and the extent to which the population and other health care providers do, or could, avail themselves of professional chiropractic services.

Chiropractic health care providers in the United States are somewhat unevenly distributed, as shown in Figure 1.^{72–75} The distribution of college campus–based chiropractic teaching clinics is mapped in Figures 1 and 2, although this distribution does not fully reflect all satellite chiropractic teaching sites. Some clustering of chiropractors seems apparent relative to chiropractic college proximity; however, as noted in the legend to Figure 1, the reported distributions also include chiropractic teaching faculty. We are conducting a study that uses data obtained directly from the chiropractic state licensing boards and chiropractic colleges to map chiropractic provider distribution by county, for future inclusion in the ARF system.¹⁰⁵

A continuing relationship with a personal health care provider has the potential to improve patient and practitioner satisfaction, compliance with treatment regimens and schedules, patient disclosure of other problems, and costs

of care.¹⁰⁶ Policies to improve access to care by promoting the primacy of the relationship between usual-source practitioners and their patients^{98–101} must include consideration of all practitioners who may already be serving, or have the potential to serve, as patients’ preferred sources of regular care. The DC currently serves a role as a first point of contact with the health care system or as the main source of care for many patients, particularly in rural or underserved areas.^{46,47} Given also a strong DC–patient relationship,^{40–45} the congruence of prevention and health promotion strategies with a wellness-oriented model of chiropractic practice,^{28,32,45,53,55–57} and continued strengthening of its interprofessional acceptance and integration, chiropractic may represent the most substantially overlooked and underutilized US health workforce resource. Chiropractic care essentially serves as an invisible piece of America’s health care safety net.

Health policy and planning would be better directed by considering information on the full complement of providers available to improve access to care. Health services research must include study of the complex dynamics of health services utilization and delivery across all providers and settings, particularly in underserved and rural areas. Most important, practicing DCs and the chiropractic profession must be cognizant of how the patients within their market service areas use chiropractic as a component of their overall health care, and they must assume the necessary responsibility for ensuring that underserved and vulnerable population groups receive appropriate and adequate care. ■

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Contributors

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Human Participant Protection

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